
1 Defining Interdisciplinary Studies

Chapter Preview

For over a century, the American educational system at all levels has relied on academic disciplines as platforms from which to impart knowledge and to generate new knowledge. Today, interdisciplinary learning at all levels is far more common as there is growing recognition that it is needed to answer complex questions, solve complex problems, and gain coherent understanding of complex issues that are increasingly beyond the ability of any single discipline to address comprehensively or resolve adequately. As Carole L. Palmer (2001) writes, “The real-world research problems that scientists address rarely arise within orderly disciplinary categories, and neither do their solutions” (p. vii).

This chapter explains the meaning of interdisciplinary studies, defines interdisciplinary studies and the term *interdisciplinarity*, explains the premise of interdisciplinarity and interdisciplinary studies, examines how the terms are variably used today, and identifies metaphors commonly associated with interdisciplinary work.

The Meaning of Interdisciplinary Studies

The meaning of **interdisciplinary studies** or interdisciplinarity continues to be contested by its practitioners and critics. But emerging from this debate are key concepts around which consensus is developing and which inform the integrated definition of interdisciplinary studies that appears in this chapter. The following discussion unpacks the meaning of these terms and, in doing so, introduces students to some of the theory undergirding this developing and diverse academic field.

The “Discipline” Part of Interdisciplinary Studies

Inside the university, the term *discipline* refers to a particular branch of learning or body of knowledge such as physics, psychology, or history

(Moran, 2002, p. 2). According to the American Association for Higher Education (AAHE),

disciplines have contrasting substance and syntax . . .—ways of organizing themselves and of defining rules for making arguments and claims that others will warrant. They have different ways of talking about themselves and about the problems, topics, and issues that constitute their subject matters. (Schulman, 2002, pp. vi–vii)

Mary Taylor Huber and Sherwyn P. Morreale (2002) add that “each discipline has its own intellectual history, agreements, and disputes about subject matter and methods” and its own “community of scholars interested in teaching and learning in that field” (p. 2). Disciplines are also distinguished from one another by several factors. These include the questions disciplines ask about the world, their perspective or worldview, the set of assumptions they employ, and the methods they use to build up a body of knowledge (facts, concepts, theories) around a certain subject matter (Newell & Green, 1982, p. 25).

Disciplines are scholarly communities that define which problems should be studied, advance certain central concepts and organizing theories, embrace certain methods of investigation, provide forums for sharing research and insights, and offer career paths for scholars. A **discipline** is a particular branch of learning or body of knowledge whose defining elements—i.e., phenomena, assumptions, epistemology, concepts, theories, and methods—distinguish it from other knowledge formations. History is an example of a discipline because it meets all of the above criteria. Its **knowledge domain** consists of an enormous body of *facts* (everything that has been recorded in human history). It studies an equally enormous number of *concepts or ideas* (imperialism, slavery, democracy, the American dream). It generates *theories* about why things turned out the way they did (e.g., the great man theory argues that the American Civil War lasted so long and was so bloody because of Lincoln’s decision to issue the Emancipation Proclamation in 1862), though many historians strive to be atheoretical. And it uses a *method* that involves critical analysis of primary sources (i.e., letters, diaries, official documents, etc.) and secondary sources (i.e., books and articles about the topic) to present a picture of past events or persons within a particular time and place.

There are four clusters or **categories of traditional disciplines**,¹ the first three of which are examined closely in Chapter 3:

- The *natural sciences* (biology or “life sciences,” chemistry, Earth sciences, mathematics, and physics)
- The *social sciences* (anthropology, economics, political science, psychology, and sociology)
- The *humanities* (art and art history, history,² literature, music, philosophy, and religious studies)
- The *applied professions* (business and its subfields, communications and its subfields, criminal justice, education, engineering and its various subfields, law, social work, nursing, and medicine)

Disciplines and their defining elements, rather than being rigid and unchanging constructs, are evolving social and intellectual constructs, and as such, are time-dependent. That is, today's discipline may well have been yesterday's subdiscipline or branch of an existing discipline. An example is the evolution of history, which, prior to the mid-nineteenth century, played a minor role in colleges as a branch of literature but grew rapidly as an independent discipline that absorbed those aspects of politics and economics that had a past dimension (Kuklick, 1985, p. 50). Today, history is a well-entrenched professional discipline that is typically included within the humanities but also has allegiances to the social sciences.

The line between the disciplines and interdisciplinarity has begun to blur in recent years with the emergence of interdisciplines. These include a wide variety of interactions ranging from informal groups of scholars to well-established research and teaching communities.

Frequently cited examples are social psychology and biochemistry, though the list also includes environmental engineering, psycholinguistics, ethnomusicology, cultural anthropology, and American Studies (Klein, 1990, p. 43). Interdisciplines differ from disciplines in terms of their origins, character, status, and level of development.³ For example, molecular biology developed in response to breakthroughs from the discovery of the structure of DNA, new technologies, and complex research problems. Only by bringing together the skills and knowledge of chemists, geneticists, physicists, bacteriologists, zoologists, and botanists could the problems be solved (Sewell, 1989, pp. 95–96).

Klein (1996) speaks of the “concealed reality of interdisciplinarity” where interdisciplinarity is flourishing but is not labeled as such, as in, for instance, medicine, agriculture, and oceanography. The pattern by which the **boundary work** of interdisciplinary studies operates occurs in this way: (1) researchers detach a subject or object from existing disciplinary frameworks; (2) they fill gaps in knowledge from lack of attention to the category; and (3) if the research attains critical mass, researchers “redraw boundaries by constituting new knowledge space and new professional roles” (pp. 36–37).

For the purposes of this book, references to *disciplines* are limited to the traditional disciplines unless otherwise noted. References to specific interdisciplines and schools of thought (e.g., feminism, Marxism) are appropriately identified.

The “Inter” Part of Interdisciplinary Studies

The word *interdisciplinary* consists of two parts: *inter* and *disciplinary*. The prefix *inter* means “between, among, in the midst.” **Disciplinary** means “of or relating to a particular field of study” or specialization. So a starting point for the definition of *interdisciplinary* is “between fields of study” (Stember, 1991, p. 4). *Inter* also means “derived from two or more.”

Interdisciplinarity is the essence of interdisciplinary studies, which is manifested through research involving two or more knowledge domains.

“Inter” Means Between Fields of Study

This “between” space is **contested space**. Most interdisciplinary study examines **contested terrain**—problems or questions that are the focus of several disciplines. For example, crime in post-9/11 Washington, D.C. is an interdisciplinary problem because it is an economic problem *and* a racial problem *and* a cultural problem. William H. Newell emphasizes that the test of the interdisciplinarity of a problem is not its distance from each contributing discipline but whether the problem is fundamentally multi-faceted or complex (personal communication, June 30, 2004). The important point is that the disciplines are not the focus of the interdisciplinarian’s attention; the focus is the problem or issue or intellectual question that each discipline is addressing. The disciplines are simply a means to that end.

“Inter” Means Something Derived From Fields of Study

The “something derived from fields of study” is the insights (i.e., scholarly writing on a topic) into a specific problem generated by interested disciplines. The *action taken* on these insights by interdisciplinarians is called integration, the subject of Chapter 5.⁴ Integration is the part of the interdisciplinary research process that seeks to reconcile conflicting disciplinary insights. The result of integration—and another aspect of the prefix *inter*—is *something altogether new*, distinctive, apart from, and beyond the limits of any discipline and, thus, *additive* to knowledge. This integrative result is the *interdisciplinary understanding* of the problem, the subject of Chapter 12. This understanding can be used to formulate new policies, frame new questions, produce new products, and foster new avenues of research. Its being additive to knowledge, however, does not preclude interdisciplinarity critiquing the disciplines or interrogating knowledge structures and societal values.

Three important aspects of the prefix *inter* may be summarized as follows:

- The contested space between disciplines
- The action taken on these insights, called integration
- The something altogether new that results from integration and is additive to knowledge

The “Studies” Part of Interdisciplinary Studies

The word *studies* has had a long (since the end of World War II) and respectable history, referring initially to geographical regions (e.g., Soviet

Studies) and historical eras (e.g., Renaissance Studies). Over the past several decades, however, the term has shifted to cultural groups (including women, Hispanics, and African Americans) and also appears in a host of contexts in the natural sciences and social sciences. In fact, “studies” programs are proliferating in the modern university. In some cases, even the traditional disciplines (particularly in the humanities) are renaming themselves as studies, such as English studies and literary studies (Garber, 2001, pp. 77–79).

Why Traditional Disciplines Are Not Referred to as “Studies”

Every established discipline has a universally recognized core of knowledge, and this core is subdivided into specific courses called a **curriculum**. The curriculum of each discipline varies from institution to institution in terms of number of courses offered and the titles of courses. Despite this variety, experts in a discipline recognize these courses as uniquely the “territory” of their discipline. The reason disciplines are not referred to as history “studies” or biology “studies” is that their core of study—their curriculum—is well-established and is recognized as their research and teaching domain.

This traditional arrangement, however, is being upset by the emergence of studies programs such as environmental studies and urban studies and the changing nature and expansion of disciplines. At first, many disciplinary departments simply added “environmental” to their course titles, while others contributed entire courses to a new environmental studies program, such as environmental geology, environmental psychology, and environmental law. A similar situation developed with urban studies. The problem with these and similar “studies” is that they have not resulted in synthesis or integration and, thus, have failed to coalesce into discrete fields (Klein, 1996, pp. 96–100).⁵ For example, after three decades, there is still no definition of “urban” that enjoys general agreement, though most definitions include the interrelation between people and space. An exception is ecology, which, despite these difficulties, has managed to develop into a broad field of its own called ecological economics (Rogers, Scaife, & Rizzo, 2005, p. 267).

Studies and other multidisciplinary curricular arrangements arise in the first place because of a “perceived misfit among need, experience, information, and the prevailing structure of knowledge embodied in disciplinary organization” (Caldwell, 1983, pp. 247–249). These new structures represent fundamental challenges to the existing structure of knowledge and formal education. In this sense, these new structures or studies share with interdisciplinary studies (as described in this book) a broad dissatisfaction with traditional knowledge structures and a recognition that the kinds of complex problems facing humanity demand that new ways be found to order knowledge and bridge different approaches to its creation and communication.

Why “Studies” Is an Integral Part of Interdisciplinary Studies

“Studies” is an integral part of interdisciplinary studies because it refers to a wide array of knowledge domains, work, and educational programs that involve crossing disciplinary domains. These studies include (1) interdisciplinary programs that include a core of courses, (2) established interdisciplinary fields such as area studies (e.g., Middle East) and materials science, and (3) newer fields such as environmental studies, urban studies, and cultural studies.

To identify the key differences between the disciplines and interdisciplinary studies and thereby sharpen the contrast between them, a good place to start is to explain why “studies” is an essential component of interdisciplinary studies. The seven main characteristics of the established disciplines are compared and contrasted with those of interdisciplinary studies in Table 1.1.

There are three differences (#1, #2, and #3) and four similarities (#4, #5, #6, and #7). The differences explain why the use of “studies” in interdisciplinary studies is appropriate:

- Interdisciplinary studies does not lay claim to a universally recognized core of knowledge but rather draws on existing disciplinary knowledge (and even nondisciplinary knowledge) while always transcending it via integration (#1).
- Interdisciplinary studies has a research process of its own to generate knowledge but freely borrows methods from the disciplines when appropriate (#2).
- Interdisciplinary studies, like the disciplines, seeks to produce new knowledge, but unlike them, it seeks to accomplish this via the process of integration (#3).

Why “Studies” Is Plural

“Studies” is plural, observes Klein (1996), because of the idea of interaction between disciplines (p. 10). Imagine the world of knowledge wherein each discipline is like a box containing thousands of dots, each dot representing a bit of knowledge discovered by an expert in that discipline. Then imagine similar boxes representing other disciplines, each filled with dots of knowledge. Scholars interested in “studies” are excited by the prospect of examining a broad issue or complex question that requires looking inside as many disciplinary boxes as necessary in order to identify those dots of knowledge that have some bearing on the issue or question under investigation. “Studies” scholars, including those in interdisciplinary studies, are in the business of identifying and connecting dots of knowledge regardless of the disciplinary box in which they reside (Long, 2002, p. 14).

Table 1.1 Comparison of Established Disciplines to Interdisciplinary Studies

<i>Established Disciplines^a</i>	<i>Interdisciplinary Studies</i>
1. Claim a body of knowledge about certain subjects or objects	1. Claims a burgeoning professional literature of increasing sophistication, depth of analysis, and thus utility. This literature includes subspecialties on interdisciplinary theory, program administration, curriculum design, research process, and assessment. Most important, a growing body of explicitly interdisciplinary research on real-world problems is emerging.
2. Have methods of acquiring knowledge and theories to order that knowledge	2. Makes use of disciplinary methods, but these are subsumed under a research process of its own that involves drawing on relevant disciplinary insights, concepts, theories, and methods to produce new knowledge
3. Seek to generate new knowledge, concepts, and theories, within or related to their domains	3. Produces new knowledge, more comprehensive understandings, new meanings, and cognitive advancements
4. Possess a recognized core of courses	4. Is beginning to form a core of courses
5. Have their own community of experts	5. Is forming its own community of experts
6. Are self-contained and seek to control their respective domains as they relate to each other	6. Is largely dependent on the disciplines for its source material
7. Train future experts in their discipline-specific master's and doctoral programs	7. Is training future experts in older fields such as American studies and in newer fields such as cultural studies through its master's and doctoral programs and undergraduate majors. Interdisciplinary studies still often hires those with disciplinary PhDs.

a. This column is based, in part, on Jill Vickers (1998), p. 34.

Interdisciplinary studies are not interested in merely rearranging these ever-changing dots of knowledge but in *integrating* them into a whole that is larger than the sum of its parts.

Studies programs recognize that many research problems cannot easily be addressed from the confines of individual disciplines because they require the participation of many experts, each viewing the problem from their distinctive disciplinary perspective. Critics of studies programs, say Liora Salter and Alison Hearn (1996), charge that they lack disciplinary “substance and good scholarship” (p. 3). “Substance” and “scholarship” are typically code words for **disciplinary depth**—intensive focus on a discipline or subdiscipline. A contrasting view is that a purely disciplinary focus sacrifices breadth, comprehensiveness, and realism for depth. An integrated

view recognizes that there is a symbiosis between disciplinary and interdisciplinary research.

Newell speaks for many interdisciplinarians, arguing that interdisciplinary studies is able to achieve as much depth as do the disciplines:

[T]o the extent that interdisciplinary study harnesses disciplinary depth and rigor, it utilizes similar notions of depth and rigor; but to the extent that it is engaged in a different intellectual enterprise from the disciplines (especially integration), it must have some different notions of depth and rigor in addition. (personal communication, June 30, 2004)

This is not to say that a “studies” program is superior to a disciplinary one. That would be a mistake because the purpose of each is different. Both are needed, particularly in a world characterized by increasing complexity, conflict, and fragmentation.

Other Knowledge Formations

Though the disciplines are widely recognized sources or resources for knowledge and thought, there are other sources of knowledge or knowledge formations of interest to interdisciplinarians. **Knowledge formations** “(alternatives to disciplines) are both bodies of knowledge and processes of coming to know that contain within themselves dynamic patterns from which they have been generated and by which they will be transformed” (Carp, 2001, p. 71). Some of these knowledge formations are

- The knowledge of workers (carpenters, mechanics, Web site designers, farmers)
- The knowledge oppressed peoples have of those who are oppressing them (Carp, 2001, p. 74)⁶
- The knowledge West African immigrants have of “the system” and how it works in New York City (Stoller, 1997, pp. 91–118)
- The knowledge of Songhay sorcerers and other spiritualists
- The knowledge of parents gazing into the eyes of infants
- The knowledge of indigenous peoples about places they traditionally inhabit (Carp, 2001, p. 74)
- The knowledge that Judith Baca (1994) calls “maintaining a relationship with the dust of one’s ancestors which requires a generational relationship with the land and a respectful treatment of other life found on the land.”
- The knowledge of the varieties of local, vernacular, or cross-cultural knowledge that is sometimes critical for success (Carp, 2001, pp. 74–75)

All sources of potential insight are not equal. These “other sources” of knowledge are useful or even necessary to function well in a particular context

or to think about a specific concern. However, they have dramatically different standing from knowledge that has stood the test of expert scrutiny. Under certain circumstances, these other knowledge formations may achieve credibility in the Academy and even find their way into the literatures of the disciplines. In women's studies, for example, testimonial or "lived experience" plays a crucial role. In native studies, "traditional knowledge preserved over centuries through oral tradition and interpreted by elders is central" (Vickers, 1998, p. 23). While knowledge produced by the disciplines, compared to these other sources of knowledge, is generally considered the proper focus of the modern academy, Richard M. Carp (2001) reminds us as scholars, "We do not know what we do not know" (p. 75). Regarding the existence of multiple knowledge formations (i.e., these "other sources" and disciplinary knowledge), interdisciplinarians should be more imaginative, more inquiring, and more open than are disciplinarians about what they do not yet know. Still, we should be skeptical of insights that have not been carefully tested.

A Definition of Interdisciplinary Studies

Three definitions of interdisciplinary studies have gained wide recognition and express an emerging consensus among practitioners on what constitutes interdisciplinary research. The first is the definition advanced by Klein and Newell (1997):

[Interdisciplinary studies is] a *process* of answering a question, solving a problem, or addressing a topic that is too broad or complex to be dealt with adequately by a single discipline or profession . . . and draws on disciplinary perspectives and integrates their insights through construction of a more comprehensive perspective. (pp. 393–394, italics added)

This definition and its core premises have been incorporated into the definition of interdisciplinary research recently advanced by the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine (2005):

Interdisciplinary research (IDR) is a mode of research by teams or individuals that *integrates* information, data, techniques, tools, perspectives, concepts, and/or theories *from two or more disciplines or bodies of specialized knowledge* to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice. (p. 39, italics added)

Veronica Boix Mansilla (2005) is particularly concerned with the product of interdisciplinary work or "interdisciplinary understanding." This, she says, is

the capacity to integrate knowledge and modes of thinking drawn from two or more disciplines to produce a *cognitive advancement*—for example, explaining a phenomenon, solving a problem, creating a product, or raising a new question—in ways that would have been unlikely through single disciplinary means. (p. 16, italics added)

These definitions agree that interdisciplinarity involves

- A process mode of research
- The disciplines or bodies of specialized knowledge (i.e., disciplinary “perspectives”)
- Integration of disciplinary insights
- A cognitive advancement

From these definitions, it is possible to advance an integrated definition of interdisciplinary studies:

Interdisciplinary studies is a process of answering a question, solving a problem, or addressing a topic that is too broad or complex to be dealt with adequately by a single discipline and draws on disciplinary perspectives and integrates their insights to produce a more comprehensive understanding or cognitive advancement.

This definition includes four concepts—process, disciplinary perspectives (the subject of Chapter 3), insights, and an interdisciplinary understanding (the subject of Chapter 12). Research of any kind is a process—a means or a tool, not an end—and to conduct research, it is reasonable to make this process as systematic as possible. Interdisciplinary researchers typically describe the doing of interdisciplinary research as a “process” rather than “method” because process allows for greater methodological flexibility, particularly when working in the humanities. It also includes the notion of **reflexive scholarship** or self-critique. As Matts Alvesson and Kaj Sköldböck (2000) maintain, “The process of research must include self-reflexivity” (p. 144).

Many disciplinary writers, particularly those in the social sciences and even in the natural sciences, also use the term *process* to describe their approaches to research, even though using specific research methods is part of the “process” (e.g., Neuman, 2006, p. 13).

An **insight** is a scholarly contribution to the clear understanding of a problem. Insights into a problem can be produced either by disciplinary experts or by interdisciplinary researchers. An **interdisciplinary insight** is produced when the interdisciplinary research process (or some version of it) is used to create an integrated and purposeful understanding of the problem. This process involves drawing on relevant **disciplinary insights** that are expert views on a particular problem. As used in this book, insights refer to scholarship produced by disciplinary experts, unless otherwise stated.

What Interdisciplinary Studies Is Not

Interdisciplinary studies is further clarified by determining what it is not.

Interdisciplinary Studies Is Not Multidisciplinary Studies

Regrettably, the terms “interdisciplinarity” and “multidisciplinarity” have often been seen as synonymous and, consequently, have caused much confusion. **Multidisciplinarity** refers to the placing side by side of insights from two or more disciplines as, for example, one might find in a course that invites instructors from different departments to explain their discipline’s perspective on the course topic in serial fashion but makes no attempt to integrate the insights produced by these perspectives into an interdisciplinary understanding of the topic. “Here the relationship between the disciplines is merely one of proximity,” explains Joe Moran (2002); “there is no real integration between them” (p. 16). Merely bringing insights from different disciplines together in some way but failing to engage in the hard work of integration is **multidisciplinary studies**, not interdisciplinary studies. The main difference between them lies in the mechanism of the research process and the end product (Rogers et al., 2005, p. 267).

Two metaphors effectively illustrate the essential difference between these two terms: the fruit salad and the smoothie. Multidisciplinary studies can be compared to a fruit salad containing a variety of fruits, each fruit representing a discipline and each fruit being in close proximity to the others. The number of fruits used and the proportions of each in the salad may not be based on anything more than visual appeal. This is not so with interdisciplinary studies, however, which Moti Nissani (1995) compares to a “smoothie.” The smoothie is “finely blended so that the distinctive flavor of each [fruit] is no longer recognizable, yielding instead the delectable experience of the smoothie” (p. 125). The metaphor of the smoothie, while limited, illustrates four essential characteristics of interdisciplinary studies:

- The selection of fruits (i.e., the disciplines) was not random but purposeful with the end product clearly in view.
- The process was integrative, meaning that it changed the contribution of each fruit (i.e., disciplinary insight) (Newell, 1998, p. 548).
- The product, compared to the ingredients used, was something new and comprehensive.
- The activity was limited in time and space to creating this new and single product (an integrated result).

Lawrence Wheeler’s instructive fable of building a house for an elephant illustrates a typical multidisciplinary approach to solving a complex problem:

Once upon a time a planning group was formed to design a house for an elephant. On the committee were an architect, an interior designer,

an engineer, a sociologist, and a psychologist. The elephant was highly educated too . . . but he was not on the committee.

The five professionals met and elected the architect as their chairman. His firm was paying the engineer's salary, and the consulting fees of the other experts, which, of course, made him the natural leader of the group.

At their *fourth* meeting they agreed it was time to get at the essentials of their problem. The architect asked just two things: "How much money can the elephant spend?" and "What does the site look like?"

The engineer said that precast concrete was the ideal material for elephant houses, especially as his firm had a new computer just begging for a stress problem to run.

The psychologist and the sociologist whispered together and then one of them said, "How many elephants are going to live in this house? . . . It turned out that *one* elephant was a psychological problem, but *two* or more were a sociological matter. The group finally agreed that though *one* elephant was buying the house, he might eventually marry and raise a family. Each consultant could, therefore, take a legitimate interest in the problem.

The interior designer asked, "What do elephants do when they're at home?"

"They lean against things," said the engineer. "We'll need strong walls."

"They eat a lot," said the psychologist. "You'll want a big dining room . . . and they like the color green."

"As a sociological matter," said the sociologist, "I can tell you that they mate standing up. You'll need high ceilings."

So they built the elephant a house. It had precast concrete walls, high ceilings, and a large dining area. It was painted green to remind him of the jungle. And it was completed for only 15% over the original estimate.

The elephant moved in. He always ate outdoors, so he used the dining room for a library . . . but it wasn't very cozy.

He never leaned against anything, because he had lived in circus tents for years, and knew that walls fall down when you lean on them.

The girl he married *hated* green, and so did he. They were *very* urban elephants.

And the sociologist was wrong too. . . . they didn't stand up. So the high ceilings merely produced echoes that greatly annoyed the elephants. They moved out in less than six months! (Wheeler & Miller, 1970, n.p.)

This story shows how disciplinary experts usually approach a complex task: They perceive it from the narrow (i.e., monistic) perspective of their specialty and fail to take into account the perspectives of other relevant disciplines, professions, or interested parties (in this case, the elephant), or even of other sources of knowledge.

By contrast, multidisciplinary and interdisciplinarity seek to overcome disciplinary monism, but in different ways. Multidisciplinary limits its activity to merely appreciating different disciplinary perspectives. But interdisciplinarity means defying disciplinary limits on what theories, concepts, and methods are appropriate to a problem and being open to alternative methods of inquiry, using different disciplinary tools, and carefully estimating the degree of usefulness of one tool versus another to shed light on the problem (Nikitina, 2005, pp. 413–414).

Interdisciplinary Studies Is Not Transdisciplinary Studies

The contrast between interdisciplinary studies and transdisciplinary studies lies in their differing approaches to the disciplines. Interdisciplinary studies relies primarily on the disciplines for their perspectives, insights, data, concepts, theories, and methods in the process of developing an interdisciplinary understanding of a *particular* problem, not a class of similar problems. **Transdisciplinarity** is “the application of theories, concepts, or methods across disciplines with the intent of developing an overarching synthesis” (Lattuca, 2001, p. 83).

Transdisciplinarity, like interdisciplinarity, is descriptive of collaborative research and problem solving that, unlike interdisciplinarity, crosses both disciplinary boundaries *and sectors of society* by including stakeholders in the public and private domains.

Transdisciplinarity differs from interdisciplinarity in that the theories, concepts, or methods are not borrowed from one discipline and applied to other disciplines interested in the same problem, but rather transcend disciplines and are therefore applicable to many fields. An example of a transdisciplinary approach is sociobiology, which applies the principles of natural selection and evolutionary biology to the study of animal social behavior (Lattuca, 2001, p. 83). In **transdisciplinary study**, a problem or theme such as “the city” or “sustainability” becomes the focus of interest. Such mega and complex problems require collaboration among a hybrid mix of actors from different disciplines, professions, and sectors of society (Klein, 2003, pp. 12, 19).⁷ In the 1990s, transdisciplinarity began appearing more often in the humanities as a label for critical evaluation of knowledge formations. For example, in women’s and gender studies, Dölling and Hark (2000) associated transdisciplinarity with critical evaluation of terms, concepts, and methods that cross disciplinary boundaries (pp. 1196–1197).

The Premise of Interdisciplinary Studies

A major **premise of interdisciplinary studies** is that the disciplines (including interdisciplines) themselves are the necessary preconditions for and foundations of interdisciplinarity.⁸ This premise is implicit both in the definition

of interdisciplinary studies and, as already noted, in the very concept of interdisciplinarity itself. “Precondition” means prerequisite; it also means preparation. The disciplines, despite their limitations, are appropriate starting points for doing interdisciplinary research. They have, after all, produced “the historical and cultural artifacts embodying, participating in, and regenerating a complex of factors tied to psychological, economic, structural, and intercultural developments in Western Europe and the United States over the past two-and-a-half centuries” (Carp, 2001, pp. 78–79).

Furthermore, to ignore the disciplines and the wealth of knowledge that they have generated would severely constrain the interdisciplinarian’s ability to research almost any conceivable topic. “Foundation” means the basis upon which something stands, like a house standing on a foundation. The disciplines are foundational to interdisciplinary research because they provide the perspectives, epistemologies, assumptions, concepts, theories, and methods that inform our ability as humans to understand our world. The “house” or integrated understanding that the interdisciplinarian ultimately constructs on this disciplinary foundation may well include other sources of knowledge, as previously noted. Saying that the disciplines are the necessary “preconditions for” and “foundations of” interdisciplinarity does not mean that the other sources of knowledge that Carp and others insist on using in their interdisciplinary work should be excluded or even marginalized in every instance. However, when these other sources of knowledge—these other knowledge formations—are used, the interdisciplinary researcher must integrate them with disciplinary knowledge at some point in order to achieve the goal or result of the interdisciplinary research process—an interdisciplinary understanding. This understanding provides new meaning to the object of inquiry. The term **meaning** is important in the humanities, where it is often equated with the intent of the author or artist (Bal, 2002, p. 27).⁹

Competing Impulses Behind the Term *Interdisciplinarity*

Interdisciplinarians have differing views on the role of the disciplines. There are, writes Moran (2002), two “competing impulses” behind the term *interdisciplinarity* (p. 15). On the one hand, there is the search for a wide-ranging, total knowledge; on the other hand, there is a more radical questioning of the nature of knowledge and our attempts to organize and communicate it. In this sense, says Moran, interdisciplinarity “interlocks with concerns of epistemology—the study of knowledge—and tends to be centered around problems and questions that cannot be addressed or solved within the existing disciplines” (p. 15).

These two differing impulses have implications for the meaning of interdisciplinarity. As Geoffrey Bennington (1999) points out, *inter* is an ambiguous prefix that can mean forming a communication between or joining together. Indeed, the term *interdisciplinarity* is slippery: “It can suggest forging connections across the disciplines; but it can also mean establishing

a kind of undisciplined space in the interstices between disciplines, or even attempting to transcend disciplinary boundaries altogether” (p. 104). This ambiguity of interdisciplinarity, says Moran (2002), is a major reason why some critics have come up with other terms, such as “post-disciplinary,” “anti-disciplinary,” and “transdisciplinary.” These terms that are often loosely defined and used interchangeably suggest that being interdisciplinary is not quite enough and that there is another intellectual level where disciplinary divisions can be subverted or even erased (p. 15).

The integrated definition of interdisciplinary studies noted earlier assumes “the existence and relative resilience of disciplines as modes of thought and institutional practices” (Moran, 2002, p. 17). This book agrees with Moran and other practitioners who view interdisciplinarity as complementary to the disciplines. The disciplines and the knowledge they produce in terms of insights, theories, and methods make interdisciplinary studies possible. This book explores how students can profitably use the disciplines, interdisciplines, and schools of thought to produce new understandings.

How the Term *Interdisciplinarity* Is Variably Used Today

The term *interdisciplinarity* has undergone a metamorphosis since it was coined by the Organization for Economic Cooperation and Development (OECD) in France in 1972. The OECD distinguished multi-, pluri-, inter-, and transdisciplinary forms of knowledge formation from disciplinarity (pp. 25–26). According to this typology, the most basic distinction is between “multidisciplinarity” and “interdisciplinarity.” As noted earlier, multidisciplinarity juxtaposes disciplinary perspectives. The disciplines speak with separate voices on a problem of mutual interest. However, the disciplinary status quo is not interrogated, and the distinctive elements of each discipline retain their original identity. In contrast, interdisciplinarity consciously integrates separate disciplinary data, concepts, theories, and methods to produce an interdisciplinary understanding of a complex problem or intellectual question (Klein & Newell, 1997, p. 393).

Forms of Interdisciplinarity

Klein (2005a) cautions, however, that not all interdisciplinaritys are the same. “Disagreements about definition,” she says, “reflect differing views of the purpose of research and education, the role of disciplines, and the role of critique” (p. 55). There are three major forms of interdisciplinarity: instrumental interdisciplinarity, conceptual interdisciplinarity, and critical interdisciplinarity. **Instrumental interdisciplinarity** is a pragmatic approach that focuses on research, methodological borrowing, and practical problem

solving in response to the external demands of society. However, borrowing alone is not sufficient for instrumental interdisciplinarity but requires integration. The key distinction between instrumental interdisciplinarity and critical interdisciplinarity (discussed later in this chapter) is the objective: Instrumental interdisciplinarity seeks to solve real-world problems or to illuminate and critique the assumptions of the perspectives (disciplinary, ideological, etc.) on which interdisciplinarity draws. This book reflects an instrumental approach. Interdisciplinarity is seen to result from “disciplinary slippage” or the space between disciplines that leads to the establishment of new interdisciplines (Klein, 1990, p. 42). Cellular biology is an example of an interdiscipline that developed out of physics, chemistry, and biology.¹⁰

Conceptual interdisciplinarity, also pragmatic, emphasizes the integration of knowledge and the importance of posing questions that have no single disciplinary basis (Salter & Hearn, 1996, p. 9). This notion of interdisciplinarity often implies a critique of disciplinary understandings of the problem, as in the case of cultural studies, feminist, and postmodern approaches. An example of conceptual interdisciplinarity, where the integrative concept is identity, is a study of the role of reggae music in affirming the cultural and political identity of postcolonial black Jamaicans (Lattuca, 2001, pp. 83–84).

The third form of interdisciplinarity is **critical interdisciplinarity**, which aims to interrogate existing structures of knowledge and education, raising questions of value and purpose. Critical interdisciplinarians fault the pragmatists for merely combining existing disciplinary approaches without advocating transformation. Rather than building bridges across academic units for practical problem-solving purposes, critical interdisciplinarians seek to transform and dismantle the boundary between the literary and the political, treat cultural objects relationally, and advocate inclusion of low culture (Klein, 2005a, pp. 57–58).

Yet, these distinctions between pragmatic and critical interdisciplinarity are not absolute. Research on systemic and complex problems such as the environment and healthcare often reflects a combination of critique and problem-solving approaches. The integrated definition of interdisciplinarity studies noted earlier reflects an emerging consensus approach to the field: It is pragmatic, yet leaves room for critique and interrogation of the disciplines as well as economic, political, and social structures.

Interdisciplinarity, then, “has developed from an idea into a complex set of claims, activities, and structures” (Klein, 1996, p. 209). Identification of some of the more important of these follows.

Interdisciplinarity Is Used to Describe Work

There are four aspects of the work of interdisciplinarity studies.

The Work of Integrating Knowledge

According to Boix Mansilla and Howard Gardner (2003), the principal work of interdisciplinary studies is the integration of knowledge and of modes of thinking from two or more disciplines. "Integration," they say, is the "blend[ing] into a functioning or unified whole" (p. 1). The **integration of knowledge**, then, means identifying and blending knowledge from relevant disciplines to produce an interdisciplinary understanding of a particular problem or intellectual question that is limited in time and to a particular context that would not be possible by relying solely on a single disciplinary approach. For example, a single disciplinary perspective cannot possibly explain the complex phenomenon of terrorism, much less craft a comprehensive solution to it. Understanding terrorism in an interdisciplinary sense calls for drawing on insights from history, political science, cultural anthropology, sociology, law, economics, religious studies, and psychology and integrating these to produce a more comprehensive understanding of it. By drawing on multiple disciplines, says Boix Mansilla (2002), interdisciplinary study "advances our understanding [by explaining complex phenomena, crafting comprehensive solutions, and raising new questions] in ways that would have not been possible through single disciplinary means" (p. 7). The work of integrating knowledge is also about practical problem solving (Boix Mansilla & Gardner, 2003, p. 2).¹¹ Interdisciplinary work often leads to the formation of new fields. Examples of the growing variety of such fields include ecology; environmental sciences; resource management; landscape development; industrial ecology; medical ecology; human ecology; social ecology; public health; cancer research; biotechnology; sociology of knowledge; discourse studies; science, technology, and society studies; future studies; conflict studies; cultural studies; media studies; communication studies; information sciences; cybernetics; computer sciences; systems sciences; and knowledge management (Klein, 2003, p. 16).

The Work of Integrating Disciplinary Modes of Thinking

Mode of thinking means the way of thinking and perceiving reality that characterizes a discipline—i.e., its perspective. Identifying and blending information from various disciplines about a problem or question is difficult enough; harder still is learning how each discipline thinks, approaches problem solving, conducts research, and creates new knowledge. This discipline-specific information that interdisciplinarians use in their research to produce an interdisciplinary understanding is characteristic of the symbiosis noted earlier between disciplinary and interdisciplinary research. Chapters 3 and 4 examine this discipline-specific information. The disciplines, though difficult to master and constantly changing in character, remain invaluable ways to perceive and understand the world (Boix Mansilla & Gardner, 2003, p. 8).

The Work of Recognizing and Confronting Differences

Recognizing and confronting differences stands in contrast to the initial transdisciplinary ideal that believed in a world in which differences were to be overcome, thus making the unity of knowledge possible. “The reality,” Klein (1996) argues,

is that differences matter. Even if negotiated and mediated, differences do not go away—they continue to create “noise.” Misunderstandings, animosities, and competitions cannot be mitigated or glossed over. They must be taken seriously as attempts are made to spell out differences and their possible consequences. Interdisciplinarity . . . does not trust that everything will work out if everyone will just sit down and talk to each other. (p. 221)

The differences that Klein and others say that interdisciplinary studies must recognize and confront include differences over values such as political agendas, cultural traditions, and religious animosities. Klein’s straightforward statement is a realistic assessment of the human condition as it is, not as it ought to be. Interdisciplinarity embraces reality. But, despite claims to the contrary, life is not inherently interdisciplinary. An example of a topic reflecting political and cultural differences is a study of education for democratic citizenship in which the student uses political liberalism and civic republicanism to critique each one’s assumption and expose each one’s over-reliance on rights and duties.

Interdisciplinary study seeks to integrate knowledge (as it pertains to a particular problem) rather than to unify knowledge. **Unifying knowledge** implies blending differences out of existence in subservience to an “overarching idea” such as feminism or Marxism. Integration, however, confronts differences, looks for common ground despite those differences, and, ultimately, produces an interdisciplinary understanding that takes those differences into account.

Each interdisciplinary studies research project requires drawing on a different combination of disciplines and insights because knowledge and problems are contextual and contingent. One practitioner expresses it this way: For interdisciplinarians, the “definition of intellectuality shifts from absolute answers and solutions to tentativeness and reflexivity” (Klein, 1996, p. 214). Chapters 2 and 5 discuss the kind of thinking that students should ideally exhibit.

Interdisciplinarity Is Used to Describe a Research Process

The interdisciplinary research process is the subject of Chapters 6–12. As noted in the integrated definition of interdisciplinary studies, the purpose or product of the research process is a cognitive advancement or interdisciplinary understanding of a particular problem. Integration is a means to that

end, not an end in itself. The integrative part of the interdisciplinary research process involves identifying relevant disciplinary insights into the problem; evaluating ways in which these may conflict; creating or discovering the common ground concept, theory, or assumption by which the insights can be reconciled; and thereby producing an interdisciplinary understanding of the problem. This research process is described in Figure 1.1.



Figure 1.1 The Interdisciplinary Research Process

Interdisciplinarity Is Used to Describe the Kind of Knowledge Produced

Veronica Boix Mansilla, William C. Miller, and Howard Gardner (2000) are concerned about the kind of knowledge that interdisciplinary studies produces. “Individuals demonstrate **disciplinary understanding** [boldface added] when they use knowledge and modes of thinking in disciplines such as history, science, or the arts, to create products, solve problems, and offer explanations that echo the work of disciplinary experts.” By contrast, “individuals demonstrate **interdisciplinary understanding** when they integrate knowledge and modes of thinking from two or more disciplines in order to create products, solve problems, and offer explanations, in ways that would not have been possible through single disciplinary means” (pp. 17–18).

Interdisciplinarity Is Used to Describe a Change in Knowledge Production

Knowledge production refers to scholarly research published in the form of peer-reviewed articles and books. The discussion about interdisciplinarity is a dialogue about innovation—that is, *change*—in the means of knowledge production. Disciplinary researchers traditionally are trained to produce knowledge differently than are interdisciplinarians. Interdisciplinarians borrow from the disciplines and integrate this information to produce new insights and meanings.¹² This activity, which goes against the grain of what many disciplinary researchers have been taught to do and to protect, is needed because knowledge is increasingly interdisciplinary and boundary crossing is commonplace.

Metaphors Commonly Used to Describe Interdisciplinary Work

A **metaphor** is a figure of speech in which a word or phrase, a story, or a picture is likened to the idea that one is attempting to communicate, as shown in the metaphors of the smoothie and the elephant house. Metaphors are extremely useful in helping us visualize an unfamiliar concept (Lakoff & Johnson, 1980, p. ix). Metaphors are important to interdisciplinary work and thinking in two ways: They communicate to disciplinarians the nature of interdisciplinary work in an overall sense, and they model the integrative result of a specific research project. Commonly used metaphors descriptive of interdisciplinary work in a general sense warrant discussion.

The Metaphor of “Boundary Crossing”

Boundary crossing is the process of moving across knowledge formations for the purpose of achieving an enlarged understanding. Boundaries between knowledge units—academic disciplines—are in a continuous, though imperceptibly slow, process of breaking down and reformulating. Indeed, boundary crossing with respect to knowledge production has become the defining characteristic of our age (Klein, 1996, p. 1).

Boundaries exist in many forms, including political, social, economic, religious, and ethnic. Surrounded by boundaries, we are mostly unaware of their existence until we find one blocking our progress. Boundary-related topics include the boundaries between science, religion, and humanist ethics concerning embryonic stem cell research and human cloning; the boundaries between religion, politics, and education concerning private school vouchers and the Bush administration’s faith-based initiative; and the boundaries between politics, business (management), and sociology (race) concerning governmental (at all levels) responses to disasters such as Hurricane Katrina.

One boundary that is less known but no less important is the boundary between academic disciplines, or, as Klein (1996) calls it, a “specialist domain.” “Boundary,” she says, “has become a new keyword in discussions of knowledge” (p. 1). Words related to “boundary” include “turf,” “territory,” and “domain.”

The metaphor of “boundary crossing” is useful to interdisciplinarians because it calls attention to the ways that disciplines have historically staked out their differences, claims, and activities and have built institutional structures to define and protect their knowledge practices (Klein, 1996, p. 1). “Boundary” can also be descriptive of something that is artificial and needlessly obstructive. This is the sense that Steve Fuller (1993) ascribes to the metaphor when he calls disciplinary boundaries “artificial barriers to the transaction of knowledge claims. Such boundaries are necessary evils that become more evil the more they are perceived as necessary” (p. 36).

There are at least two problems, though, with the boundary metaphor. First, it conveys the incorrect notion of a static line or space that fails to allow adequately for changes within a discipline or overlapping aims and activities among disciplines. Also, territorial metaphors fail to describe adequately the role of language between disciplines (Lyon, 1992, p. 682). Few boundaries or languages remain fixed—at least not for very long. This is certainly true in the Academy.

Reasons for crossing boundaries are several and will be discussed in later chapters. For interdisciplinarians, the primary reason for crossing boundaries is to develop a more comprehensive understanding of the problem that would not otherwise be possible by examining it from the perspective of a single discipline.

The Metaphor of Bridge Building

The metaphor of **bridge building** connotes the borrowing of tools and methods from disciplines (Squires, 1975, pp. 42–47). There are two attractions to this metaphor. The first is the idea of showing how interdisciplinary activity, like the spun cables suspended from the piers of the Golden Gate Bridge and firmly anchored in the bedrock on either shore, is something that takes place between two disciplines. The second attraction is the idea that interdisciplinary study has an applied orientation that students find attractive. Possible bridge building topics include explorations of how environmentalists can work with business and government to sustain the environment while meeting the economic development needs of the indigenous society, and how better communication and understanding can be developed between hostile racial, religious, and other groups.

There is, however, a problem with using “bridge building” to describe interdisciplinary studies, the interdisciplinary process, and integration: “Bridge builders do not tend to engage in critical reflection on problem choice, the epistemology of the disciplines being used, or the logic of disciplinary structure” (Klein, 1996, pp. 10–11). In other words, this metaphor suggests that interdisciplinary study is less concerned with the knowledge, perspectives, theories, and methods of those disciplines relevant to the problem or question under investigation than with the construction of a theory (i.e., cable) that would connect the disciplines.

The Metaphor of “Mapping”

Mapping or mapmaking is a metaphor based on the idea that the carving up of knowledge space is like the practice of cartography or mapmaking. Mapping involves using a “combinational” or integrative method to map or display information that is gathered from a variety of sources (Szostak, 2004, p. 143). European cartographers produced a system of mapping geographical and political space by lines of longitude and latitude forming territorial quadrangles that

symbolically represented the world. These divisions were further subdivided into smaller units and, in turn, into still smaller units. In the absence of global positioning systems, inaccuracies abounded and disputes inevitably arose over who owned what sliver of territory (Stoddard, 1991, p. 6).

The classic illustration of this errant approach to mapping was the 1884 partitioning of Africa. Someone has calculated that of the colonial borders that dissected the continent and its peoples, fully 30% were arbitrary (Stoddard, 1991, p. 6). The remapping of the Earth's surface in our own day is occurring at the same time we are remapping knowledge.

Mapping a problem—breaking it down into its component parts and seeing how these parts behave and relate to one another—is an important strategy used by disciplinarians and interdisciplinarians to analyze complex problems. Mapping a problem such as spousal battery, for example, is likely to require the researcher to seek insights from several disciplines to explain its causes. Chapter 7 introduces various ways to map the problem.

The usefulness of the metaphor of mapping or remapping is that it reveals new interdisciplinary fields and the extent of border crossing between disciplines (Klein, 1996, p. 3). The weakness of this metaphor, however, is that it compares knowledge (which is fluid) to land (which is more stable). Another weakness is that maps tend to emphasize some aspects over others, constrain thought, and even mislead at times. Szostak (2004) notes that “maps may represent the concerns and interests of the powerful, as when black population centers were ignored on maps of South Africa” (pp. 143–144).

The Metaphor of “Bilingualism”

Bilingualism is a popular, but inappropriate, metaphor for interdisciplinary work that implies mastery of two complete languages. Its attraction is that it compares disciplines to foreign languages. For many, developing proficiency in a foreign language is as difficult and time-consuming as developing knowledge of a new discipline. The problem with this metaphor is that mastery of two complete languages rarely, if ever, occurs. Klein (1996) says that pidgin and Creole are the typifying forms of interdisciplinary communication (p. 220). **Pidgin** is a simplified speech used for communication between people with different languages for a limited purpose; **Creole** is a new first language among a hybrid community of knowers (Fuller, 1993, p. 45; Stoddard, 1991). The minimal condition for the possibility of interdisciplinary work involving teams of experts from different disciplines, cautions Klein (1996), must be “communicative competence” (p. 220).

Lest students feel that they must find just the right metaphor to express visually what they are attempting to do, Klein's (1996) point that “interdisciplinary activities cannot be depicted in a single image” (p. 19; Klein, 2000, p. 9) is well taken.¹³ Interdisciplinarians are able to communicate the concept of interdisciplinarity to disciplinarians more effectively when they are mindful of the aspect of interdisciplinarity that each of these metaphors illuminates while being aware of its limitations.

CHAPTER SUMMARY

Interdisciplinary studies and interdisciplinarity are evolving dynamic concepts that are now mainstream in the Academy. Still, many disciplinarians use the terms multidisciplinary and interdisciplinarity interchangeably and are unaware of the role of integration and of the goal of the interdisciplinary enterprise. This chapter has defined these terms, explained the differences between the disciplines and interdisciplinary studies, examined how interdisciplinarity is different from multidisciplinary and transdisciplinarity, and identified the ways that interdisciplinarity is variably used today. Lastly, this chapter has identified strengths and weaknesses of various metaphors descriptive of interdisciplinary studies.

Chapter 2 presents the etymology of interdisciplinarity, examines the interdisciplinary critique of the disciplines, traces the origins of interdisciplinarity, and describes the interdisciplinary approach to learning, thinking, and research.

NOTES

1. For the limited purposes of this book, I am using traditional lists of major disciplines rather than the much fuller contemporary taxonomies.
2. History can be studied in two broad ways—the social science version that is theory-driven and often quantitative in its scientific testing of hypotheses, and the humanities version that is qualitative, narrative, and nonscientific, painting mental pictures with words rather than testing formal hypotheses, or with a conceptual and methodological pluralism that draws on both approaches.
3. See Klein, 1996, pp. 78–84, for a detailed discussion of these differences.
4. Not all interdisciplinarians agree that integration is the hallmark of interdisciplinarity. Lisa Lattuca (2001) prefers to distinguish between types of interdisciplinarity by focusing on the kinds of questions asked rather than on integration (p. 80). Joe Moran (2002) understands interdisciplinarity loosely to mean “any form of dialog or interaction between two or more disciplines” (p. 16). For Moran and others, the terms *interdisciplinarity* and *integration* are synonymous with *teamwork*, as in team teaching and cross-disciplinary communication on research projects (Klein, 2005b, p. 23; Lattuca, 2001, p. 12; J. R. Davis, 1995, p. 44).
5. However, some argue that some fields of studies have achieved this state.
6. This is an example of what Salter and Hearn (1996) call “critical interdisciplinarity,” which poses a challenge to the disciplines. See the discussion of this form of interdisciplinarity in Lattuca (2001), pp. 117–118.
7. For a thorough discussion of the strengths and limitations of transdisciplinarity, see Somerville & Rapport (Eds.) (2000), *Transdisciplinarity: Recreating Integrated Knowledge*, particularly the chapters by Klein and Newell.
8. However, as Klein (2005a) notes, interdisciplinarity can no longer be regarded as a single kind of activity framed against a stable disciplinary system (p. 69).
9. In the humanities, students are required to choose a definition of meaning: artist intent, audience reaction, and so on. However, Rick Szostak (2004) argues that the interdisciplinary conception of “meaning” should urge students to embrace all possible definitions and the causal links they imply. Students “could still choose

to specialize with respect to one of these (or not) without needing to assume the others away” (p. 44).

10. This form, also known as “strategic” or “opportunistic,” gained increased visibility during the 1980s in science-based areas of intense international economic competition, especially computers, biotechnology, manufacturing, and high technology. “Pragmatic” interdisciplinarity serves the political economy of the market and national needs. It seeks to build bridges within academia and between academia and society at large (Klein, 2005a, p. 57).

11. They talk about a variety of forms of interdisciplinary work. In their work in total, though, they emphasize epistemic goals that are contingent upon “practical” contexts.

12. Klein (1990) states, “There are no standards for excellence in borrowing” (p. 94).

13. More recently, Klein (2000) concludes that “territorial metaphors may be obsolete” and suggests that organic metaphors, such as boundary crossing, that highlight connection may be more useful because “knowledge production is no longer strictly within disciplinary boundaries” (pp. 8–9).

REVIEW QUESTIONS

1. What are the characteristics or defining elements of a discipline?
2. Why is history a discipline and not “studies,” and interdisciplinary is “studies” and not a discipline?
3. What are the three important aspects of the prefix *inter*?
4. Which of the seven main characteristics of the established disciplines are shared by interdisciplinary studies, and which ones are not?
5. What four concepts are embedded in the integrated definition of interdisciplinary studies used in this book?
6. What are some other sources of knowledge that interdisciplinarians such as Carp argue should be used in interdisciplinary work?
7. Why is Nissani’s “smoothie” analogy of interdisciplinarity more useful than the fruit salad analogy?
8. In what ways is Lawrence Wheeler’s fable of building the elephant house illustrative of a typical multidisciplinary approach to solving a complex problem?
9. How would an interdisciplinary approach to building an elephant house differ from a multidisciplinary approach?
10. What is the premise of interdisciplinary studies?
11. How is the term *interdisciplinarity* variably used today?
12. Of the metaphors descriptive of interdisciplinary work identified at the end of the chapter, which seems to be most appropriate and useful?